AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [28] with the following amended paragraph:

[28] The cold side of the cryocooler bank 122 is connected to the FPAs of the instruments via a thermal connection matrix (TCM) ~~124~~114, that represents a general arrangement of thermal connections between the cryocoolers 112 and FPAs 124. In general, for redundancy, more than one cryocooler will be connected to each FPA. All cryocoolers 122 may operate simultaneously, or only a subset may operate at a given time. Where it is needed to simultaneously cool a radiation shield or optical bench, a multiple stage pulse tube cryocooler may be employed. In this example, the cryocooler may have either a multi-stage cold finger assembly or two cold finger assemblies.

Please replace paragraph [31] with the following amended paragraph:

[31] The north and/or south radiator panels 106n, 106s then combine to radiate cryocooler waste heat and extracted FPA and radiation shield thermal energy to deep space. North and south radiator panels may be thermal-mechanically connected together, as depicted in Fig. 3, with thermal-structural nadir (earth) deck or panel 106E containing embedded ambient temperature heat pipes, allowing the cryocooler bank to be located on any of the three (north, south and earth) thermally interconnected panels. During solstice seasons, the sun impinges upon either the north or south panel. This effect is mitigated by the thermal cross-coupling effect of the nadir (earth) panel 106E. Also, since the panels are in an ambient temperature range, having a solar array wing in the radiator field-of-view (FOV) is not a strong consideration as compared to radiators with cryogenic operating temperatures. For example, with the solar array in the radiator FOV, the effective sink temperature of the radiator is roughly 150 deg. K, which would not be acceptable for

cryogenic radiator requirements. However, the same radiator would reject over 30 Watts/ft^2 when coupled to a cryocooler bank with a hot side temperature of 300 deg. K.

Please replace paragraph [32] with the following amended paragraph.

[32] Fig. 4 shows in more detail TCS 130 that operates with the above described thermal control arrangement. TCS 130 receives temperature information from the FPAs via appropriate temperature sensors provided therewith, and continuously or periodically adjusts cryocooler drive signals to maintain correct operating temperatures in the presence of daily and seasonal changes in the instrument thermal environment. Referring to the drawing, a temperature error is computed by subtracting a temperature command, received from ground control or from on-board software, from the FPA measured temperature signals, $T_e = T_f - T_c$. The temperature command signal T_c may include a bias component that compensates for any known constant measurement bias errors. The temperature error T_e is then input to a filter bank ~~122~~ 132 having N channels, where N is the number of temperature-controlled FPAs. Each channel of the filter bank includes a digital filter that operates to provide high frequency noise attenuation, and whose low-frequency gain and phase characteristics are selected to provide good closed-loop disturbance rejection and transient response characteristics. Those skilled in the art are capable of designing such a filter based on a thermal dynamics model relating changes in the cooler drive signals to changes in FPA temperatures. The filtered error signals are then input to a cooler delta-drive generator, which computes these changes to cooler drive signals Δd for the M cryocoolers using the expression

$$\Delta d = -R^T (R R^T)^{-1} T_e \qquad (1)$$

where R is an NxM matrix of partial derivatives relating changes in the cooler drive signals to changes in the FPA temperatures ΔT_F.

$$\begin{bmatrix} \Delta T_{F_1} \\ \vdots \\ \Delta T_{F_N} \end{bmatrix} = R\ \Delta d = \begin{bmatrix} \frac{\partial T_{F_1}}{\partial d_1} & \frac{\partial T_{F_1}}{\partial d_2} & \cdots & \frac{\partial T_{F_1}}{\partial d_M} \\ \vdots & \vdots & & \vdots \\ \frac{\partial T_{F_N}}{\partial d_1} & \frac{\partial T_{F_N}}{\partial d_2} & & \frac{\partial T_{F_N}}{\partial d_M} \end{bmatrix} \begin{bmatrix} \Delta d_1 \\ \Delta d_2 \\ \vdots \\ \Delta d_M \end{bmatrix} \qquad (2)$$

Note that the formulation assumes that the number of active coolers is equal to or greater than the number of FPAs. The cooler drive signals [[d]]D are then compared according to

$$D = d_0 + \Delta d \qquad (3)$$

where d_0 is the nominal cooler drive set point, which is computed by the cooler set point generator ~~126~~134. Generator ~~126~~ 134 determines the nominal cooler input drive signals based on a table lookup or model that uses as inputs the commanded FPA temperatures, the FPA thermal dissipation, and the cooler hot sink temperature.